

WHAT IS CLAIMED IS:

- 1 1. A system for measuring optical characteristics comprising:
 - 2 a laser producing an excitation signal;
 - 3 a single-mode optical fiber coupled to the laser so that a coupled excitation signal
 - 4 is introduced into the optical fiber, wherein the coupled excitation signal is a continuous
 - 5 wave signal modulated at variable frequencies;
 - 6 a first detector positioned to receive radiation backscattered by the optical fiber in
 - 7 response to the coupled excitation signal.
- 1 2. The system of claim 1 further comprising an external modulator coupled
2 between the laser and the optical fiber and operating to modulate the intensity of the
3 excitation signal at a frequency that varies linearly from a first frequency to a second
4 frequency over a first duration.
- 1 3. The system of claim 1, wherein the external modulator modulates the
2 intensity of the excitation signal over a second duration immediately following the first
3 duration at a frequency that varies linearly from the first frequency to the second
4 frequency.
- 1 4. The system of claim 1 further comprising a laser driver coupled to the
2 laser and operating to modulate the intensity of the excitation signal at a frequency that
3 varies linearly from a first frequency to a second frequency over a first duration.

1 5. The system of claim 4, wherein the laser driver modulates the intensity of
2 the excitation signal over a second duration immediately following the first duration at a
3 frequency that varies linearly from the first frequency to the second frequency.

1 6. The system of claim 1, wherein the coupled excitation signal is modulated
2 at a first discrete frequency for a first duration and modulated at a second discrete
3 frequency, different from the first discrete frequency, for a second duration by an external
4 modulator coupled between the laser and the optical fiber.

1 7. The system of claim 1, wherein the coupled excitation signal is modulated
2 at a first discrete frequency for a first duration and modulated at a second discrete
3 frequency, different from the first discrete frequency, for a second duration by a laser
4 driver coupled to the laser.

1 8. The system of claim 1, further comprising a second detector positioned to
2 receive radiation backscattered by the optical fiber in response to the coupled excitation
3 signal and sensitive to a different spectrum of backscattered radiation frequencies than
4 the first detector.

1 9. The system of claim 1, further comprising an analog to digital converter
2 that converts the output of the first detector from analog to digital format